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CONSIDERAZIONE SULL'IMPATTO AMBIENTALE DEL PRIMO PARCO EOLICO MARINO PROPOSTO PER LE ISOLE MALTESI (MEDITERRANEO CENTRALE)

ENVIRONMENTAL IMPACT ASSESSMENT CONSIDERATIONS ON A PROPOSED OFFSHORE WIND FARM IN THE MALTESE ISLANDS (CENTRAL MEDITERRANEAN)

Abstract – *The potential marine ecology impacts arising from an offshore wind farm proposed for a site within coastal waters of the Maltese Islands were assessed in the summer of 2011 through a multi-tiered sampling protocol, The 11km^2- surveyed marine area was dominated by different Posidonia oceanica ecomorphoses, photophilic assemblages and sandy bottoms with accumulations of rhodolith fragments,*

Key-words: *offshore wind farm, impact assessment, benthic, Posidonia oceanica, Maltese Islands.*

Introduction – In April 2009, the Maltese government commissioned the conduction of an Environmental Impact Assessment (EIA) and of an Appropriate Assessment (AA) for the proposed development of an offshore wind farm, consisting of nineteen (subsequently increased to twenty-four) 5-MW wind turbines, within the Sikka l-Bajda reef site. Sikka l-Bajda, a Glogerina Limestone outcrop, is the most extensive reef (measuring 2.2km x 0.5km) within Maltese 'shallow' (less than 50m deep) waters, with depths generally ranging between 10m and 25m, located ca. 2km off the northeastern coast of the island of Malta and currently situated within an important bunkering area. Once operational, the offshore wind, which is expected to have a lifetime of twenty years, is expected to significantly contribute to Malta's renewable energy target of 10% by 2020. The main objective of this study is to describe the baseline benthic environment within the surveyed area and to propose alternative wind turbine arrays to minimize possible benthic impacts of the development.

Materials and Methods – A diverse array of sampling techniques was deployed in the summer of 2011 to characterize the marine benthic and pelagic environment at Sikka l-Bajda. A Remotely-Operated Vehicle (ROV) was towed along a series of inter-locking transects to cover the entire area of study. A side scan sonar survey, spread over two phases (a coarse one conducted over widely-spaced survey lines and with a frequency of 450 KHz and a finer-resolution one conducted closer to the bottom with a frequency of 900 KHz) of the same marine area was also conducted. A SCUBA semi-quantitative benthic mapping survey was conducted to ground-check the video footage gathered through the remote surveying techniques. The twenty-six SCUBA sampling locations were chosen so as to correspond with the proposed coordinates of the turbine foundations, with accumulations of coarse/maerl-type sediment, as well as with prominent benthic geomorphological features, including dolines and drop-offs. Marine benthic habitats were classified according to the Palearctic / EUNIS system as aligned for the local scenario by Borg & Schembri (2004). A 10cm-diameter corer was used to collect soft sediment samples for infaunal organisms. A 0.25m^2 quadrat was deployed

in the field in order to measure shoot density for *Posidonia oceanica*, in addition to leaf length and width, number of leaves per shoot, epiphyte loads, percentage necrosis and leaf dry weight, which were determined ex situ. During the pelagic survey, the presence of pelagic (ichthyofauna and gelatinous plankton mainly) was recorded. The results of the detailed benthic mapping exercise of the surveyed area supported the plotting of a conservation importance map of the same area. This enabled the identification of the benthic areas most sensitive to the proposed development.

Results - A total of 17 different infralittoral biocoenoses, in addition to 13 complexes of different biocoenoses, were identified during the evaluation of the ROV transect videos. An array of different *P. oceanica* morphological types, or ecomorphoses (extending over ca. half of the surveyed area), were identified from the same footage, with such types grading into each other, intermixing with enclaves and associations based on sand and/or algal assemblages and forming in many instances a heterogenous mosaic of different morphologies. The two most widespread *Posidonia oceanica* ecomorphoses recorded within the surveyed area were those of (i) continuous *Posidonia oceanica* meadows on bedrock with enclaves of photophilic algae and of (ii) Reticulate *Posidonia oceanica* meadows settled on matte, interspersed with 'bare matte' patches and facies of photophilic algae. Reticulate meadows were punctuated by circular sand basins which developed within depressions in the underlying rock. Photophilic assemblages were dominated by *Dicytopteris polypioides, Sargassum vulgare* and *Cystoseira* spp (mainly *crinita*), whilst sciaphilic ones were dominated by *Peyssonnelia squamaria* and *Flabellia petiolata.* Coarse sand bottoms were largely characterised either by accumulations of fragments of rhodoliths (extensive maerl grounds are located less than one kilometre to the north of the surveyed site), aggregated through the influence of bottom currents, dead *P. oceanica* debris or by *Caulerpa racemosa* and *Acetabularia acetabulum.* Shoaling fish species recorded from the site included *Pseudocaranx dentex, Boops boops, Chromis chromis, Spicara maena, Oblada melanura, Seriola dumerilii and Spondyliosoma cantharus,* whilst fish species observed as individuals included *Thalassoma pavo, Tripterygion tripteronotus, Dactylopterus volitans, Serranus scriba, Serranus cabrilla* and *Symphodus tinca.*

Conclusions – Based on the results of the conservation importance map, an alternative wind turbine array was plotted whereby the proposed twenty-four turbines were positioned on benthic areas of least conservation importance, in waters which were less than 30m deep, to respect the technical specifications of the project. Despite the adoption of this and of other proposed mitigation measures, a number of residual impacts are still expected to arise, such as the obliteration of benthic assemblages through the footprint of the turbine foundations, changes in the community composition of the same assemblages in the vicinity of the turbine foundations, regression of *P. oceanica* meadows and altered sediment and hydrodynamic budgets. Besides negative impacts, the proposed development could also possibly have positive marine ecology impacts, mainly through the cessation of in situ bunkering activities, the prohibition of fishing activities in the area and the provision of a platform for colonization by epifouling biota.

References

BORG, J.A., SCHEMBRI, P.J. (2004) Alignment of marine habitat data of the Maltese Islands to conform to the requirements of the EU habitats directive. In: *Marine habitats data of the Maltese Islands* (Ed M Sant), Interactive CD, Malta Environment and Planning Authority, Floriana, Malta.